PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023

Semester : Semester V - 2021
Course Code : EEE3004
Course Name : Sem V - EEE3004 - Special Electrical Machines
Program : B.TECH

Date : 31-OCT-2023
Time : 11:30AM - 1:00PM
Max Marks : 50
Weightage : 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   **(5 X 2 = 10M)**

1. Explain the open-loop control of stepper motor.

   (CO1) [Knowledge]

2. What are stepper motors? classify them based on working principal?

   (CO1) [Knowledge]

3. Recognize the micro-stepping in a stepper motor.

   (CO2) [Knowledge]

4. A stepper is motor is wound for two-phases and four-poles. It has 10 rotor poles. Find its resolution.

   (CO2) [Knowledge]

5. List out the advantages of Hybrid Stepper motor.

   (CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   **(2 X 10 = 20M)**

6. SRM is normally designed for efficient conversion of significant amounts of power, stepper motors are more usually designed to maintain step integrity in position controls. Explain any two power controller circuit for switched reluctance motor.

   (CO1) [Comprehension]

7. A permanent sine wave motor mainly consists of a static portion called a stator and a rotating section called a rotor. The laminations for axial air gap devices are probably generated by rolling them with soft steel strips. Explain the principle of operation of a brushless type of permanent sine wave motor.

   (CO2) [Comprehension]

ANSWER THE FOLLOWING QUESTION (1 X 20 = 20M)

8. **(i).** A BLDC motor has a no load speed of 6000 rpm when connected to 120 V DC source. Armature resistance is 2.5 Ω. Find the speed when it is supplied with 60V and developing a torque of 0.5 Nm. Neglect constant losses. The no load current is 1A.

(ii)A five-phase stepper motor has 40 rotor teeth. It drives a lead screw having a pitch of 10 threads per cm. The lead screw in turn produces a linear motion of a cutting tool. The input pulse is applied 10 times. Find the distance covered by the cutting tool.

(CO2) [Application]